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IS 4001 (1995): Mine tubs [MED 8: Mining Techniques and Equipment]

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भारतीय मानक
खान टब – विशिष्ट
(दूसरा पुनरीक्षण)
Indian Standard
MINE TUBS — SPECIFICATION
(Second Revision)

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Mine Transportation Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

This standard was first published in 1967 and revised in 1976. In the first revision, mine tubs of only one capacity, that is, 1.2 m³ were standardized. In addition tipping tubs having different shapes and capacities were excluded from the scope of this standard. Further the eccentricity test (*see 7.2*) was included to check the running profile of the wheels. In the present revision, dimensional details of drawbars and shackles have been deleted in view of the availability of IS 8534 (in six parts). These standards cover the requirements for mine tub couplings and drawbars as follows:

IS 8534 (Part 1) : 1994	Mine tub couplings and drawbars: Part 1 General requirements (<i>first revision</i>)
IS 8534 (Part 2) : 1995	Mine tub couplings and drawbars: Part 2 C-link and D-shackle type (<i>first revision</i>)
IS 8534 (Part 3) : 1995	Mine tub couplings and drawbars: Part 3 R-shackle and link type (<i>first revision</i>)
IS 8534 (Part 4) : 1995	Mine tub couplings and drawbars: Part 4 F-shackle and link type (<i>first revision</i>)
IS 8534 (Part 5) : 1995	Mine tub couplings and drawbars: Part 5 Drawbars
IS 8534 (Part 6) : 1995	Mine tub couplings and drawbars: Part 6 Hook and D-shackle type

Although this standard has prescribed aluminium as the material for the manufacture of mine tubs, the mine tubs manufactured from aluminium shall not be used in underground coal mines.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MINE TUBS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies the requirements for mine tubs of capacity 1.2 m³, rail gauge 600 mm and pay load one tonne in case of coal and up to 1.5 tonne in case of other materials.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 DIMENSIONS

3.1 A typical mine tub and its components are shown in Fig. 1 to 4.

3.2 Wheels

Dimensions of the wheels of mine tubs shall be as follows:

Diameter on tread, <i>Min</i>	300 mm
Width of tread, <i>Min</i>	65 mm
Diameter on flange, <i>Min</i>	340 mm
Mean thickness of ring	10 mm
Projection of boss on tread side	Nil
Projection of boss on flange side, <i>Max</i>	25 mm

3.3 Axles

3.3.1 The diameter of axle of mine tubs shall be minimum 50 mm.

3.3.2 The straightness of the axle when measured from a flat surface shall not deviate more than 1.6 mm.

3.4 Draw Gear

Draw gear fitted with mine tubs shall have dimensions as specified in IS 8534 (Part 2 to Part 6) : 1995.

4 MATERIAL

Material used in the manufacture of tubs shall be as specified in Table 1.

5 GENERAL REQUIREMENTS

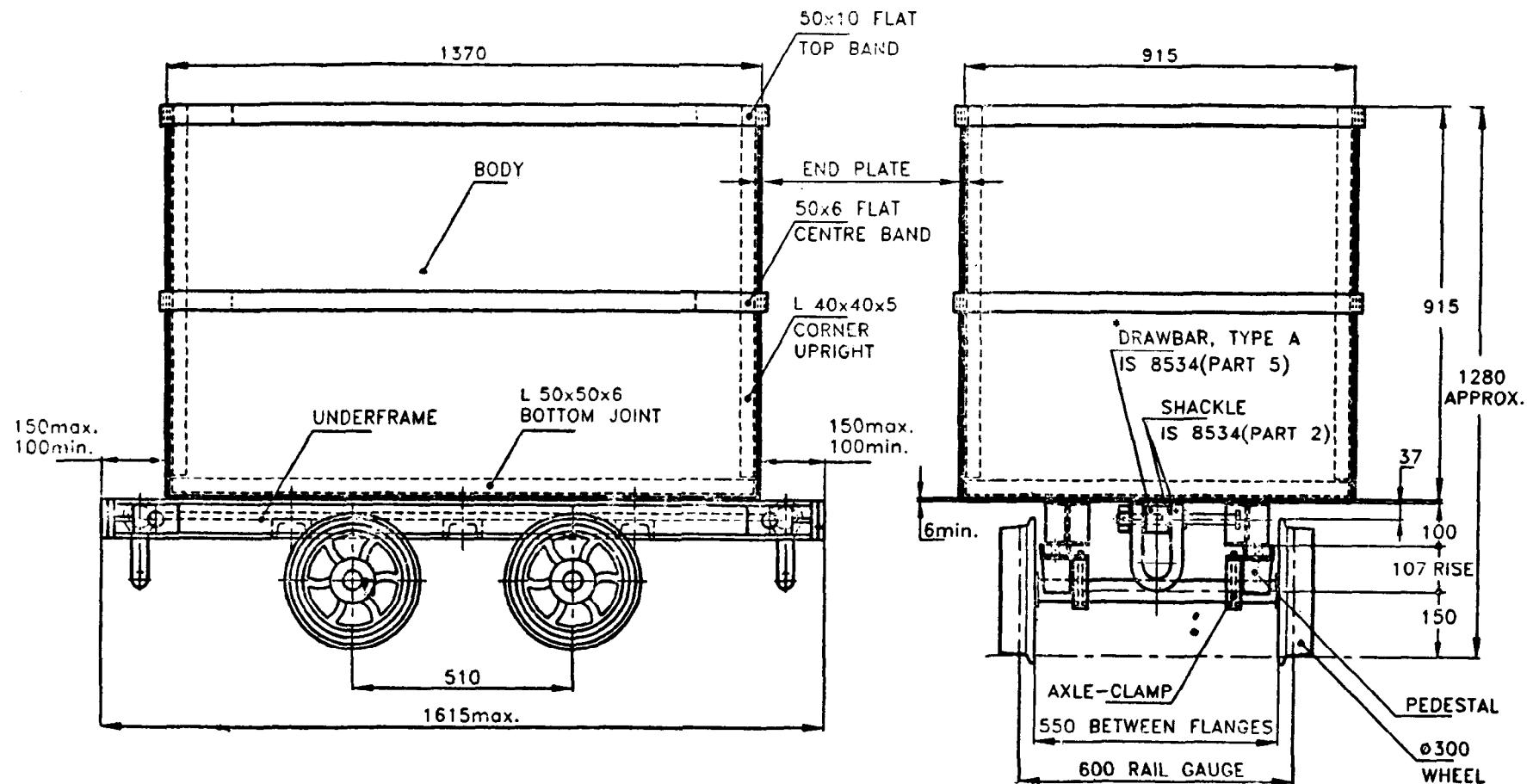
5.1 General

5.1.1 Aluminium bodies and underframes shall not be welded and aluminium rivets, when used, shall be of 55000 or 64430 alloys conforming to IS 740 : 1977.

Table 1 Materials for Components of Mine Tubs

(Clause 4)

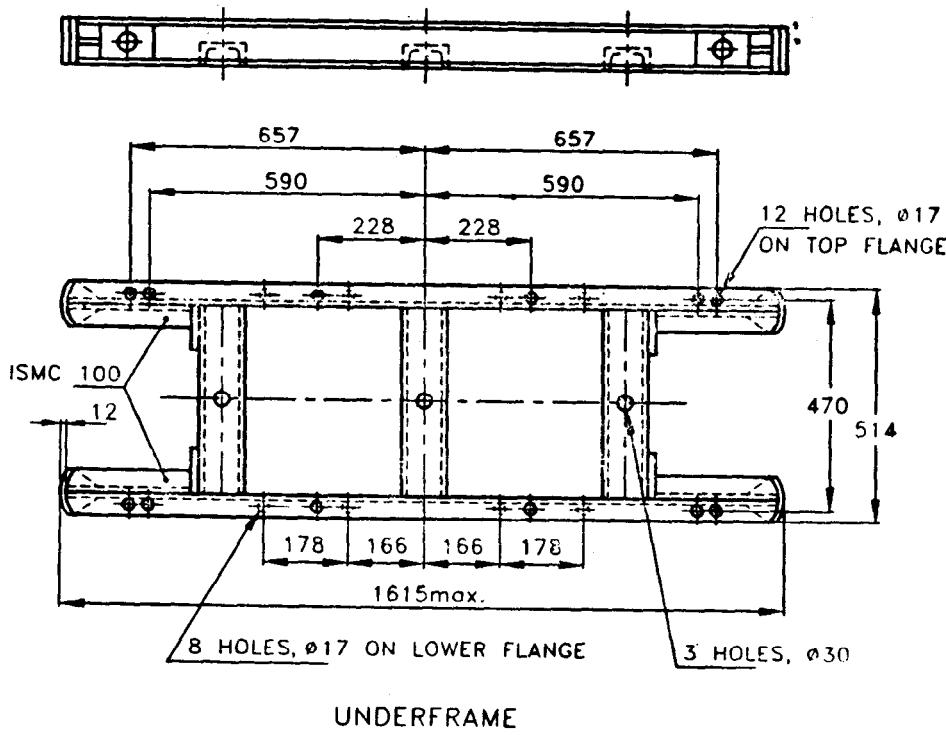
Sl. No.	Component	Material	
		Steel	Aluminium
i)	Bodies and underframes	a) Grade A of IS 2062 : 1992	a) Plates conforming to 64430 WP or 65032 WP of IS 737 : 1986; and
			b) Extruded sections conforming to 64430 WP of IS 733 : 1983.
ii)	Wheels	a) IS 1030 : 1989; or b) Grade 3 of IS 2708 : 1993; or c) IS 276 : 1992.	— — —
iii)	Pedestals	a) IS 1030 : 1989; or b) Grade FG 260 of IS 210 : 1978; or c) Grade A of IS 2107 : 1977.	— — —
iv)	Axes	a) 45C8 of IS 1570 (Part 2/Sec 1) : 1979; or b) Class 4 of IS 1875 : 1992	— —
v)	Axle clamps	IS 2062 : 1992	—



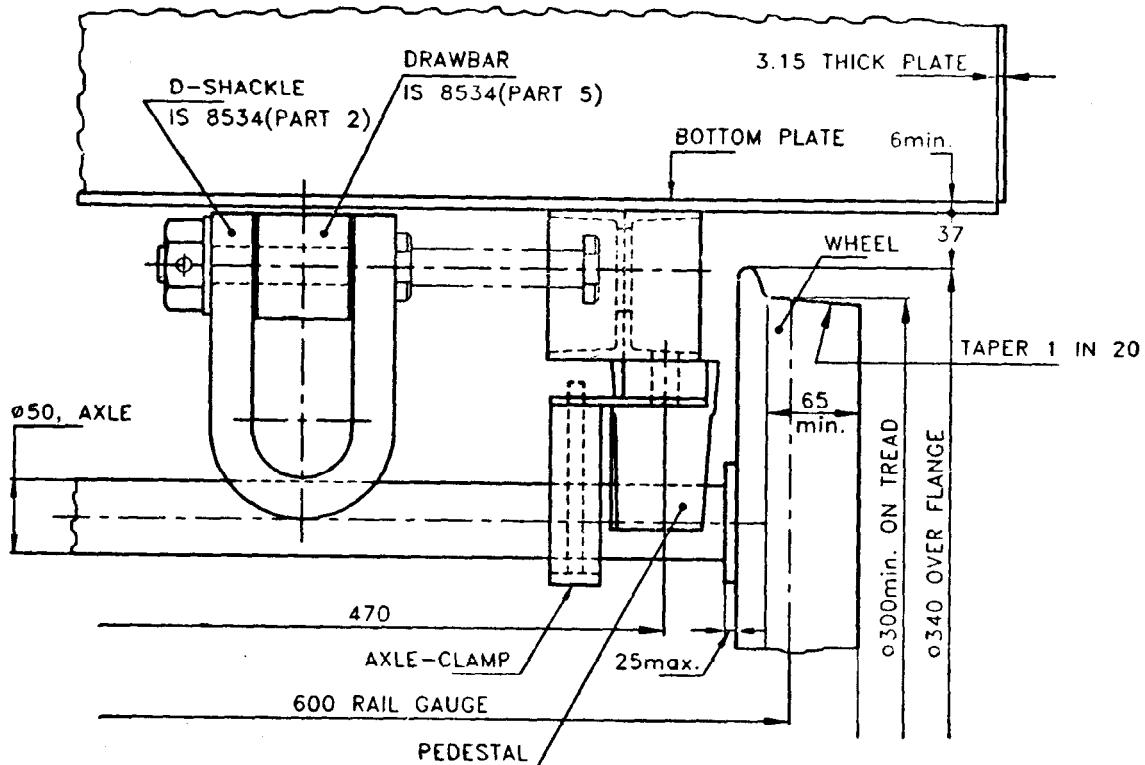
*Figure shows drawbar of Type A conforming to IS 8534 (Part 5) : 1995 with D-shackle conforming to IS 8534 (Part 2) : 1995. Alternatively drawbars of Type B conforming to IS 8534 (Part 5) : 1995 along with couplings conforming to IS 8534 (Parts 2 and 3) : 1995 or drawbar of Type C conforming to IS 8534 (Part 5) : 1995 with coupling conforming to IS 8534 (Part 4) : 1995 may be used.

All dimensions in millimetres.

FIG. 1 DIMENSIONS FOR MINE TUBS

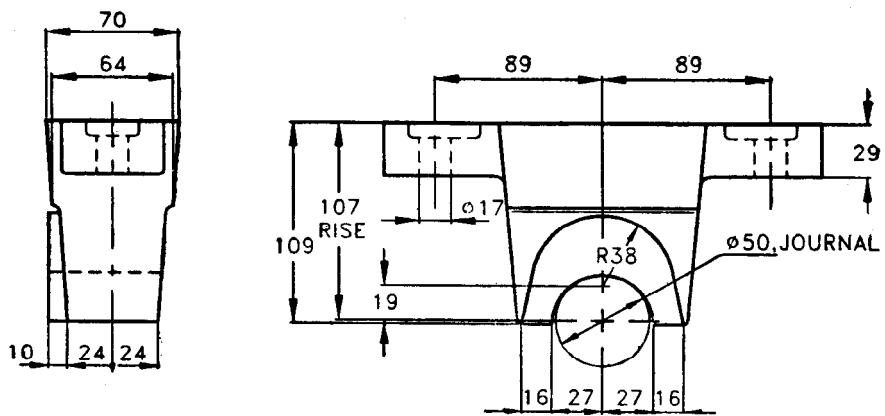


UNDERFRAME



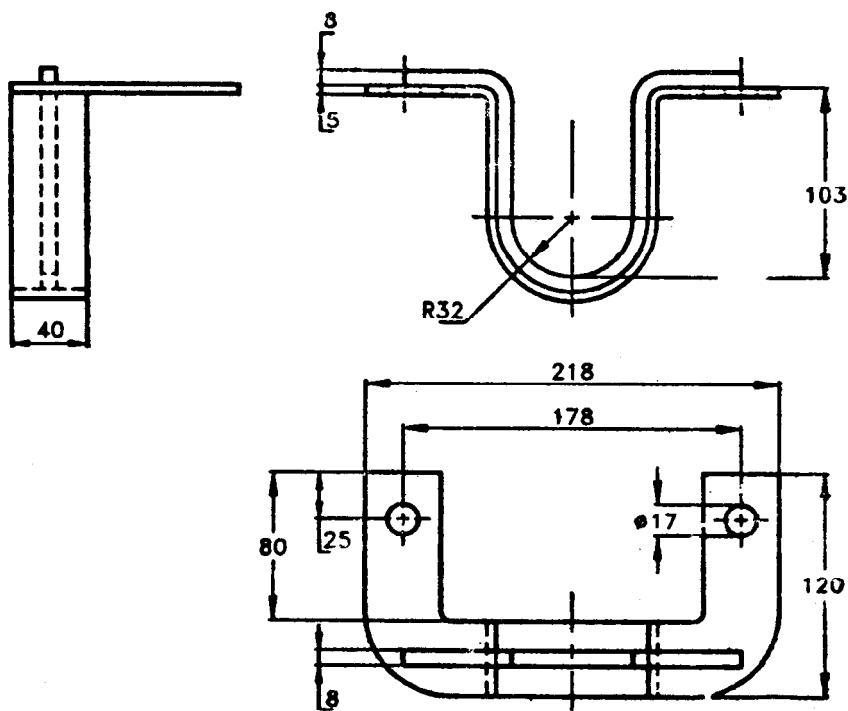
WHEEL

FIG. 2 DETAILS OF UNDERFRAME AND WHEEL



All dimensions in millimetres.

FIG. 3 DIMENSIONS FOR PEDESTALS



All dimensions in millimetres.

FIG. 4 DIMENSIONS FOR AXLE-CLAMP

5.1.2 Aluminium and steel, when combined, shall be insulated from each other either by bitumen paint or by zinc chromate primer to avoid galvanic corrosion. If steel rivets are used, a coat of zinc chromate primer shall be applied to the aluminium before riveting.

5.1.3 Ancillary handling equipment shall be well within the confines of the buffers.

5.1.4 All holes in the draw gear and underframe shall be made by drilling and not by punching.

5.2 Body

5.2.1 Bodies shall be either of riveted or welded constructions at the option of the purchaser. The bodies, made of plates of minimum thickness 3.15 mm for sides and 6 mm for bottom, shall be adequately supported on the underframe by riveting.

5.2.1.1 Internal reinforcing flats or plates shall be welded to the bottom plate. If absolute cleanliness of interior is required, the bodies shall be either welded to the underframes or shall have cleats welded outside the body for riveting to the underframe.

5.2.2 Vertical corners shall be well rounded or bevelled and lapping of side and end plates shall be so arranged as to give the minimum of projection.

5.2.3 Top edges of body shall be either of rounded or of bevelled contour or shall be reinforced at the top by suitable angles, the toes of which shall be continuously welded to the plates.

5.2.3.1 All types of reinforcements shall be continuous at the vertical joint of the plates.

5.2.4 The bodies shall be, as far as possible, free from internal projections. Stiffening corrugations running round the body, are however, permissible but shall be designed to give an unrestricted flow of material.

5.2.5 Bodies shall not have any sharp edges which may cause personal injury.

5.2.6 Where tubs are to be used on over-rope or over-chain haulage system the upper edge of the end plates shall be fitted with renewable wearing strips.

5.2.7 If required by purchaser, minimum of two plug holes shall be provided for proper drainage.

5.3 Underframe

5.3.1 Longitudinal members of steel underframes shall be made of standard channels section conforming to IS 808 : 1989. Other

members shall be made of channel or angle sections conforming to IS 808 : 1989 or IS 811 : 1988 and shall be either riveted or welded to the longitudinal members.

5.3.1.1 For longitudinal members, channel sections made from plates, flats or strips, 6.0 mm thick or more, may also be used.

5.3.1.2 If required, underframes may be made from channel of appropriate dimensions made of aluminium alloy.

5.3.2 Buffer pieces shall be fixed on the inside of the longitudinal members.

5.3.3 Steel plate of thickness 12 mm or more shall be either riveted, bolted or welded to the main underframe member to form the bufferface. To absorb buffing shocks, timber, rubber pads, springs or proprietary units of similar nature may be inserted between the bufferface and the main underframe member.

5.3.3.1 Bufferfaces shall be strengthened by welding cleats to it.

5.3.3.2 In case of aluminium, the bufferfaces shall be of reinforced construction.

5.3.4 Holes shall be made in the underframe to facilitate the changing of pin of the drawbar shackle.

5.3.4.1 Area around the hole shall be strengthened by welding plates on both sides of the hole.

5.4 Draw Gear

5.4.1 Draw gear shall conform in all respect with requirements laid down in IS 8534 (Part 1) : 1994.

5.4.2 Draw gear shall preferably consist of a continuous drawbar with attachments at each end and shall be of such a design that as far as possible a straight pull through the axis of the drawbar is obtained.

5.4.3 Drawbar shall be attached to the underframe by means of rivets.

5.4.4 The attachments shall be flexible to allow free movement on sharp curves, shall be securely connected to the drawbar and, whenever practicable easily replaceable.

5.4.5 Drawbars of lapped design shall have the lapped portion riveted and side-welded on both sides, using either automatic flash butt welding or atomic hydrogen welding process.

5.5 Wheels and Axles

5.5.1 The wheels shall be press fitted on the axles. After fitting the wheels, the axles shall be riveted on the wheels.

5.5.1.1 The riveted projection of the axle shall not exceed 6 mm.

6 HEAT TREATMENT

6.1 Wheels

6.1.1 Carbon Steel and Pearlitic Manganese Steel Castings

All castings shall be supplied in the heat-treated condition. The heat treatment shall consist of annealing, normalizing or hardening and tempering and shall be carried out at a suitable temperature to give the required mechanical properties.

6.1.2 Austenitic Manganese Steel Castings

All castings shall be supplied in the heat-treated condition, having been water quenched from a temperature of not less than 1 000°C.

6 Draw Gear

Draw gear of mine tubs shall be heat-treated as specified in IS 8534 (Part 1) : 1994. Details of the heat treatment given to the components of draw gear shall be endorsed on the certificate of test in accordance with IS 8534 (Part 1) : 1994.

7 TESTS

7.1 Destructive test and proof load tests shall be carried out on draw gear in accordance with IS 8534 (Part 1) : 1994. A certificate of test shall be supplied with each batch in accordance with IS 8534 (Part 1) : 1994.

7.2 Eccentricity Test

Axes shall be supported on two fixed V-blocks (see Fig. 5), placed at points approximately to the position of pedestals, axles shall be free to rotate in V-blocks. A fixed point *B* shall be selected approximately opposite the mid-line of the tread of the wheel. The distance between

this point and the tread shall not vary by more than 4.8 mm when the wheel is rotated by one revolution.

8 MARKING

8.1 Wheels

Each wheel shall have cast in the back of the flange, the following information in recessed projected characters not less than 10 mm high:

- a) The manufacturer's identification mark; and
- b) The letter 'C' 'PM' or 'M' to indicate carbon steel, 1.5 percent manganese steel or austenitic manganese steel respectively.

8.2 Draw Gear

8.2.1 Each component of draw gear shall be marked in accordance with requirements of IS 8534 (Part 1) : 1994.

8.2.1.1 Care shall be taken that indentation is neither too sharp nor excessive in depth.

8.3 Mine Tubs

The mine tubs shall be marked with the following information on a name-plate suitably mounted on the mine tubs:

- a) Manufacturer's identification mark, and
- b) Capacity in terms of material to be transported.

8.4 BIS Certification Marking

8.4.1 The mine tubs may also be marked with Standard Mark.

8.4.2 The use of the Standard Mark is governed by the provision of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

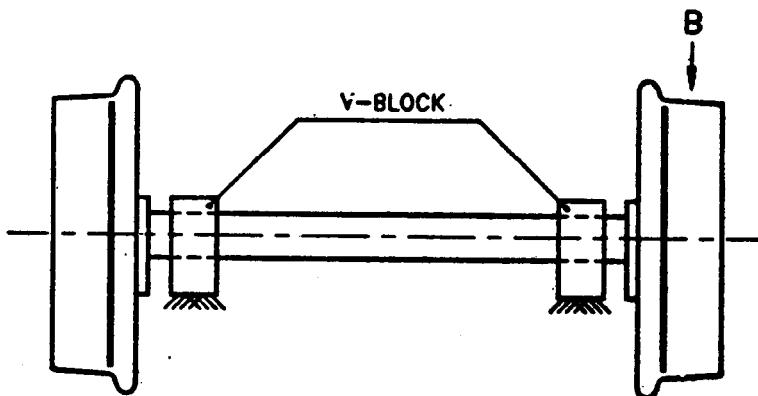


FIG. 5 ECCENTRICITY TEST

ANNEX A
(Clause 2)
LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
210 : 1978	Grey iron castings (<i>third revision</i>)		chemical composition and related properties (<i>first revision</i>)
276 : 1992	Austenitic manganese steel castings (<i>fourth revision</i>)	1875 : 1992	Carbon steel billets blooms, slabs and bars for forgings (<i>fifth revision</i>)
733 : 1983	Wrought aluminium and aluminium alloy bars, rods and sections for general engineering purposes (<i>third revision</i>)	2062 : 1992	Steel for general structural purposes (<i>fourth revision</i>)
737 : 1986	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (<i>third revision</i>)	2107 : 1977	Whiteheart malleable iron castings (<i>first revision</i>)
740 : 1977	Wrought aluminium and aluminium alloy rivet stock for general engineering purposes (<i>second revision</i>)	2708 : 1993	1.5 percent manganese steel castings for general engineering purposes (<i>third revision</i>)
808 : 1989	Dimensions for hot rolled steel beam, column channel and angle sections (<i>third revision</i>)	8534 (Part 1) : 1994	Mine tub couplings and drawbars: Part 1 General requirements (<i>first revision</i>)
811 : 1988	Cold formed light gauge structural steel sections (<i>revised</i>)	8534 (Part 2) : 1995	Mine tub couplings and drawbars: Part 2 C-link and D-shackle type (<i>first revision</i>)
1030 : 1989	Carbon steel castings for general engineering purposes (<i>fourth revision</i>)	8534 (Part 3) : 1995	Mine tub couplings and drawbars: Part 3 R-shackle and link type (<i>first revision</i>)
1570 (Part 2/ Sec 1) : 1979	Schedules for wrought steels: Part 2 Carbon steels (un-alloyed steels), Section 1 Wrought products (other than wire) with specified	8534 (Part 4) : 1995	Mine tub couplings and drawbars: Part 4 F-shackle and link type (<i>first revision</i>)
		8534 (Part 5) : 1995	Mine tub couplings and drawbars: Part 5 Drawbars
		8534 (Part 6) : 1995	Mine tub couplings and drawbars: Part 6 Hook and D-shackle type

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